TOSUN同星

Hardware IFU—TL1001

Version: V1.10 | English

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Document Revision History:

Documentation Edition	date	Update content	remarks
V1.00	2023.5.5	Create a document	
V1.10	2023.7.5	Modify the document	

catalogue

1. Product profile

1.1 Product Overview

TL1001 is a portable, easy to install 1 LIN, LIN to USB interface equipment, LIN bus equipment support rate 0 ~ 20 Kbps, the product use high-speed USB2.0 interface and PC connection, Windows and Linux system drive design makes the equipment have excellent system compatibility.

With the powerful TSMaster software, support loading DBC and ARXML database files, can easily monitor, analyze, simulate LIN bus data, can also support UDS diagnosis, ECU brush, CCCP / XCP calibration and other functions.

Can be used for Windows and Linux, secondary development API, can support all kinds of development environments, such as C + +, C #, LabView, Python, etc., easy to integrate into various test systems, efficient and easy to use.

1.2 Typical applications

- ✓ Vehicle LIN bus data collection
- ✓ Domain Controller Test
- ✓ Various automated test systems

1.3 Functions and parameters

1.3.1 Functional characteristics

- ✓ The unique free sending mode can reduce the threshold of LIN bus development and debugging
- ✓ US (microsecond) level hardware message timestamp to meet higher order requirements
- ✓ Portable design, unique designed mounting holes for easy integration into various devices or instrument panels
- ✓ High-speed USB2.0 interface, Windows, Linux system drive-free design, with excellent system compatibility
- ✓ Auto-grade design, supporting LIN, LDF file, arxml file
- ✓ LIN bus UDS based diagnosis can be supported
- ✓ Support for the UDS-based Flash Bootloader

- ✓ Support Windows, Linux system secondary development interface
- ✓ The LIN bus master and slave nodes can be software configured
- ✓ Support for blf, asc format data recording and offline / online playback
- ✓ Built-in script editing, support virtual simulation, semi-physical simulation

1.3.2 Technical parameters

channel	1 *LIN
PC terminal interface	High-speed of USB2.0
LIN terminal interface	DB9
drive	Windows, Linux system free drive free design, with excellent system compatibility
LIN	Support LIN 1.3 and 2.x, port rate 0- -20 Kbps
dispatch list	Support LDF files and run the schedule, or you can configure the schedule yourself
Time stamp accuracy	1us, the hardware message timestamp, to meet the high-order requirements
insulate	Electrostatic level contact discharge ± 8KV
supply electricity	USB power supply, and LIN communication needs external power supply
Case material	plastics
working temperature	-40℃～80℃
Working humidity	10% ~ 90% (no condensation)
work environment	Stay away from the corrosive gases

1.3.3 Electrical parameters

parameter		test condition	least value	representative value	crest value	unit
working voltage	External input to the DC power supply	Two LIN receiving channels	-	12	-	V
working current	External input to the DC power supply	VIN=12V	-	0.01	-	A
Power	External input to the DC power supply	Two LIN receiving channels	-	0.12	-	W
LIN joggle	Bus pin pressure resistance	LINO、LIN1	0	--	24	V
	VBAT voltage		5	12	24	V

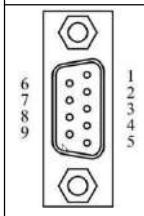
1.4 Shipping list

✓ TL1001 Host machine

2. Hardware interface description

2.1 Description of the hardware interface

- USB high-speed 2.0 interface;
- DB9 Male：

DB9 pin	pin	definition
	PIN3	GND
	PIN8	LIN
	PIN9	VBAT_LIN

2.2 LED indicator light instructions

Physical picture of the indicator light:

Instructions for indicator light:

pilot lamp	definition
LIN	The LIN channel indicator lamp
LINK	Hardware connection indicator light

Description of the indicator light color:

pigment	description
LINK green light	The device hardware is connected
LINgreen light	The LIN channel data frame is sent or received correctly
LINred lantern	The LIN channel sends or receives incorrect frames, configuration, protocol, or wiring errors

Note: The flicker frequency depends on the bus load.

3. Quick use

3.1 Download and install the TSMaster host computer

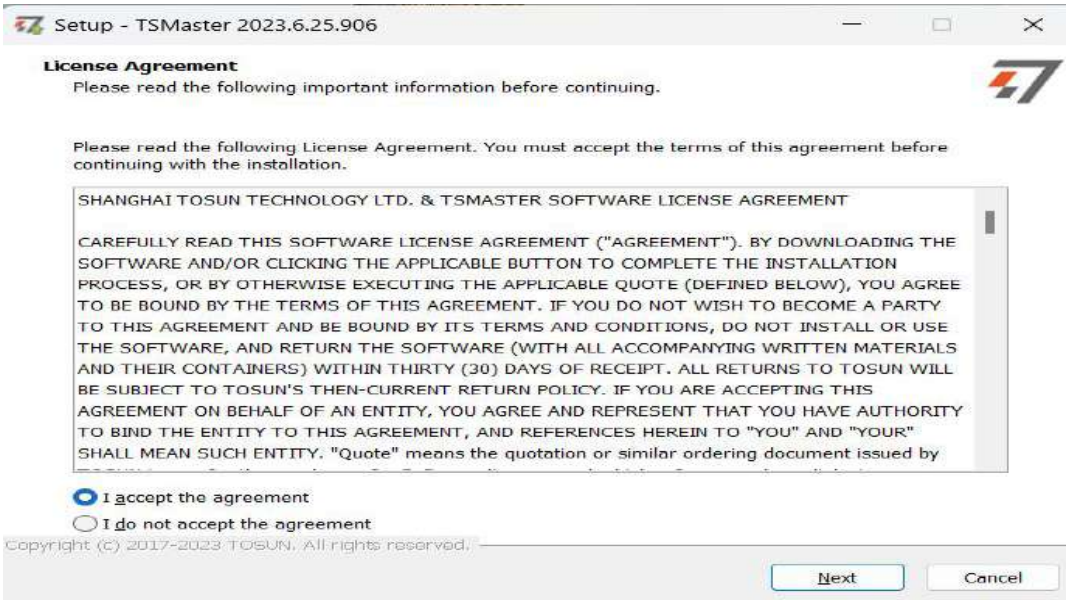
TSMaster Software download link：

http://www.tosun.tech/TOSUNSoftware/TSMaster_Setup_beta.exe

If not accessible, you can contact the corresponding sales staff or log in to the official website of the same star to get the upper machine, and you can also scan the code to follow the public account to get the download link.

Step 1:

Step 2:


Setup - TSMaster 2023.6.25.906
License Agreement
Please read the following important information before continuing.
Please read the following License Agreement. You must accept the terms of this agreement before continuing with the installation.
SHANGHAI TOSUN TECHNOLOGY LTD. & TSMASTER SOFTWARE LICENSE AGREEMENT
CAREFULLY READ THIS SOFTWARE LICENSE AGREEMENT ("AGREEMENT"). BY DOWNLOADING THE SOFTWARE AND/OR CLICKING THE APPLICABLE BUTTON TO COMPLETE THE INSTALLATION PROCESS, OR BY OTHERWISE EXECUTING THE APPLICABLE QUOTE (DEFINED BELOW), YOU AGREE TO BE BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT WISH TO BECOME A PARTY TO THIS AGREEMENT AND BE BOUND BY ITS TERMS AND CONDITIONS, DO NOT INSTALL OR USE THE SOFTWARE, AND RETURN THE SOFTWARE (WITH ALL ACCOMPANYING WRITTEN MATERIALS AND THEIR CONTAINERS) WITHIN THIRTY (30) DAYS OF RECEIPT. ALL RETURNS TO TOSUN WILL BE SUBJECT TO TOSUN'S THEN-CURRENT RETURN POLICY. IF YOU ARE ACCEPTING THIS AGREEMENT ON BEHALF OF AN ENTITY, YOU AGREE AND REPRESENT THAT YOU HAVE AUTHORITY TO BIND THE ENTITY TO THIS AGREEMENT, AND REFERENCES HEREIN TO "YOU" AND "YOUR" SHALL MEAN SUCH ENTITY. "Quote" means the quotation or similar ordering document issued by
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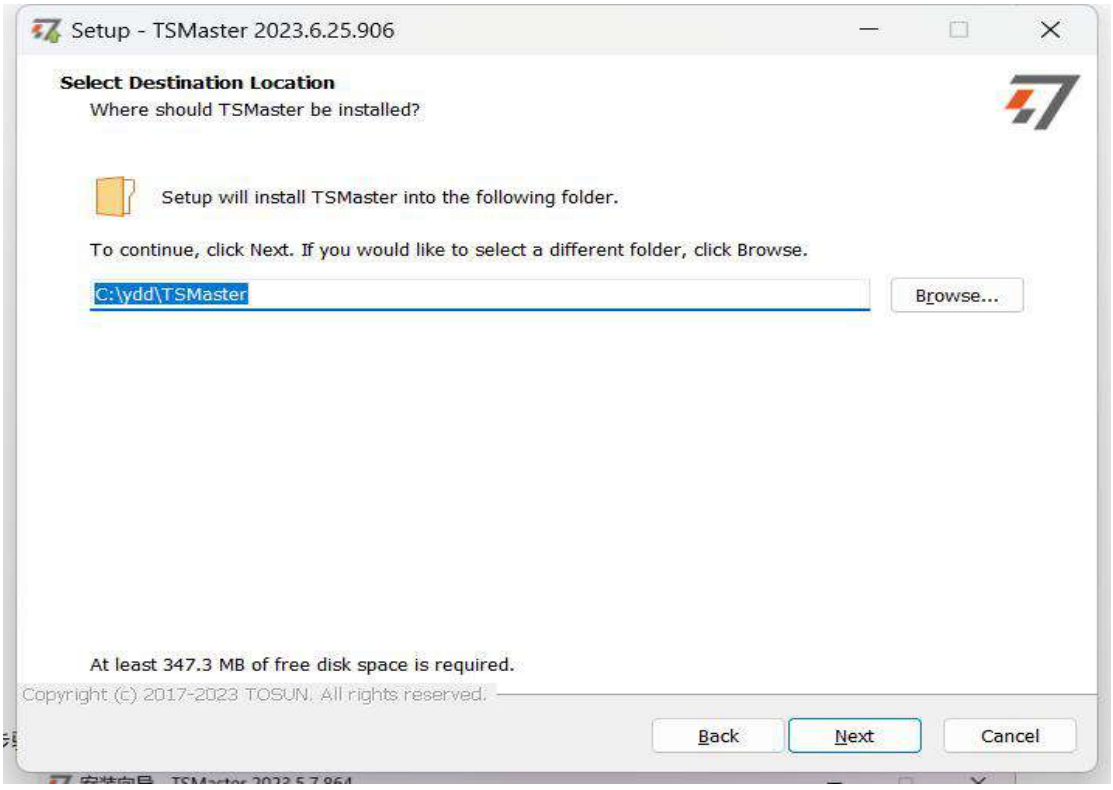
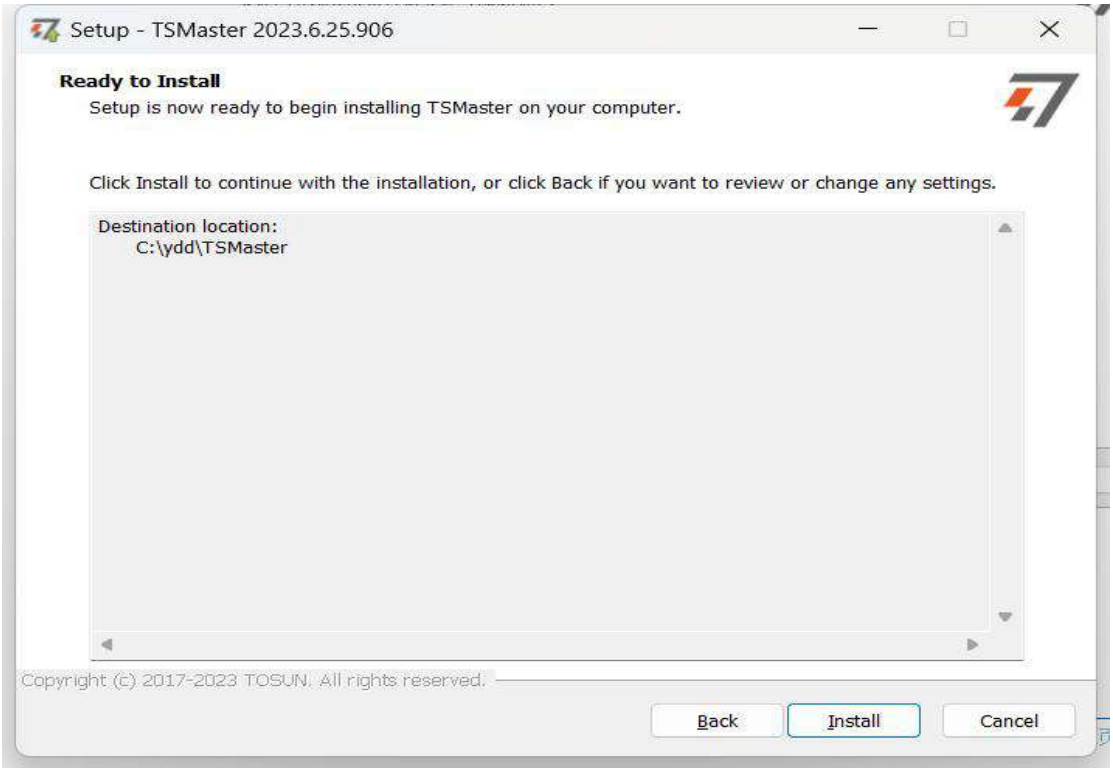
Next
Cancel

Step 3:


Setup - TSMaster 2023.6.25.906
Select Destination Location
Where should TSMaster be installed?
Setup will install TSMaster into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\ydd\TSMaster
Browse...
At least 347.3 MB of free disk space is required.
Copyright (c) 2017-2023 TOSUN. All rights reserved.
Back
Next
Cancel

Step 4:

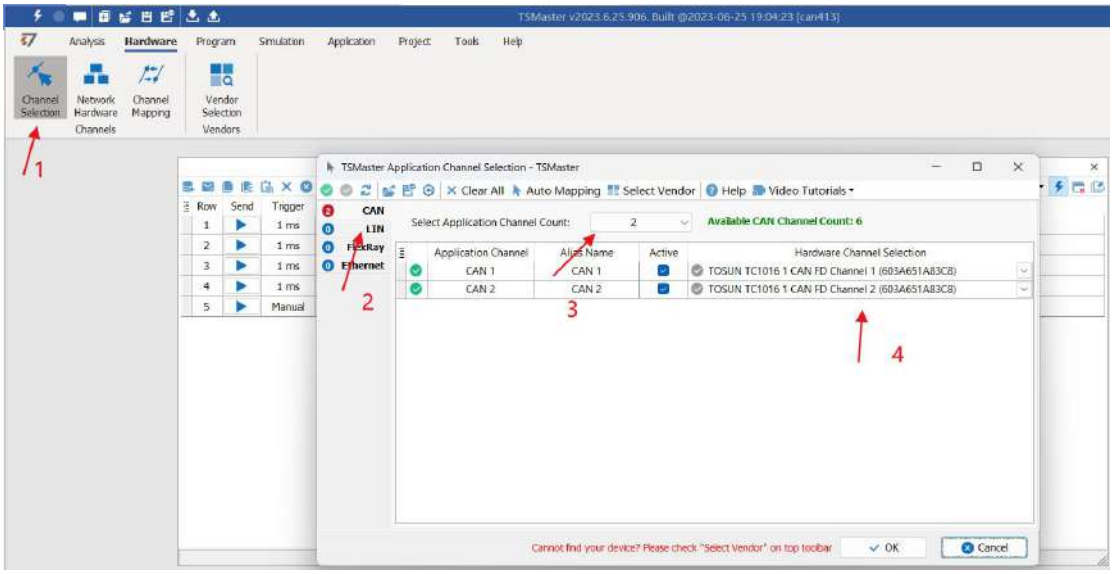


Complete installation:

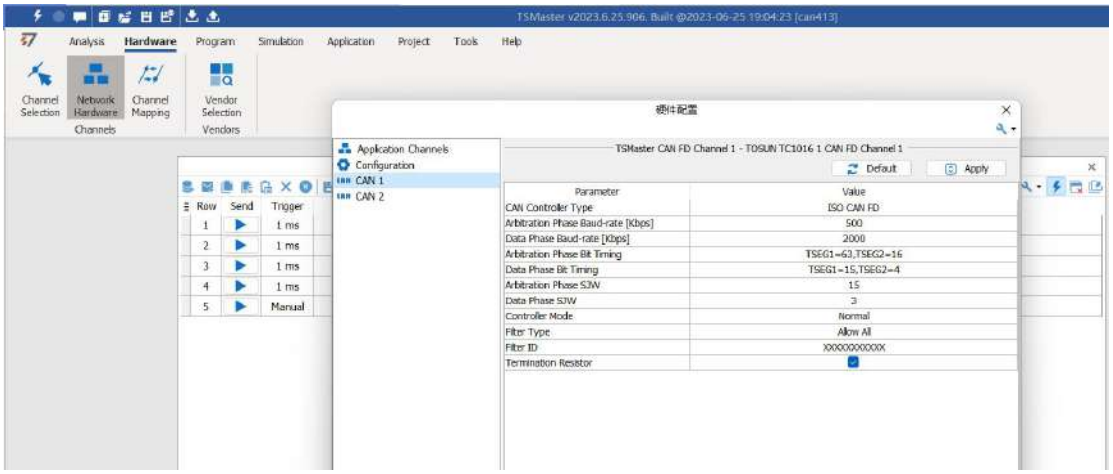
3.2 Connect devices and configure channels

All TOSUN devices are drive-free, and can connect directly without download driver.

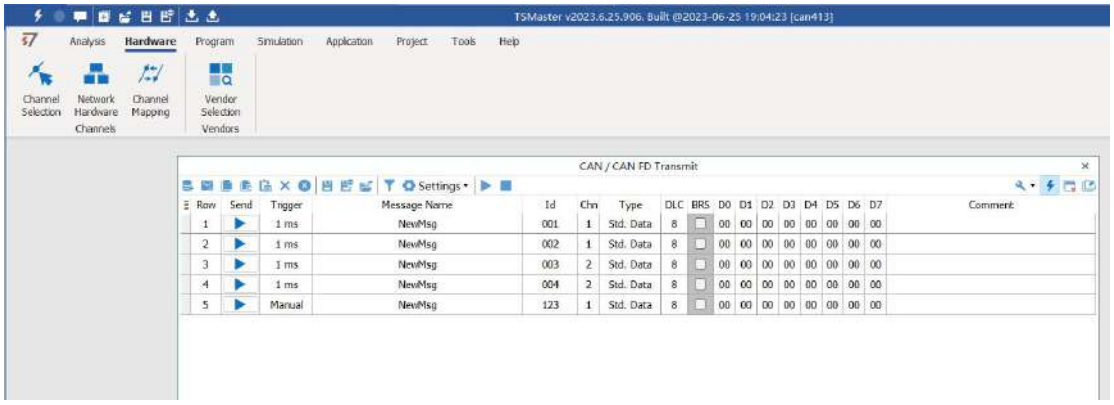
In TSMaster software interface: Click Hardware-click channel selection-drop-down box Select number of channels-select hardware channel-click OK



In the hardware configuration, the CAN / CAN FD protocol can be switched, and the baud rate and switch terminal resistance can be adjusted. After the configuration is completed, click application can take effect.



3.3 Message sending



After the hardware connection is completed and the software is configured, the function of message sending can be realized:

operating steps:

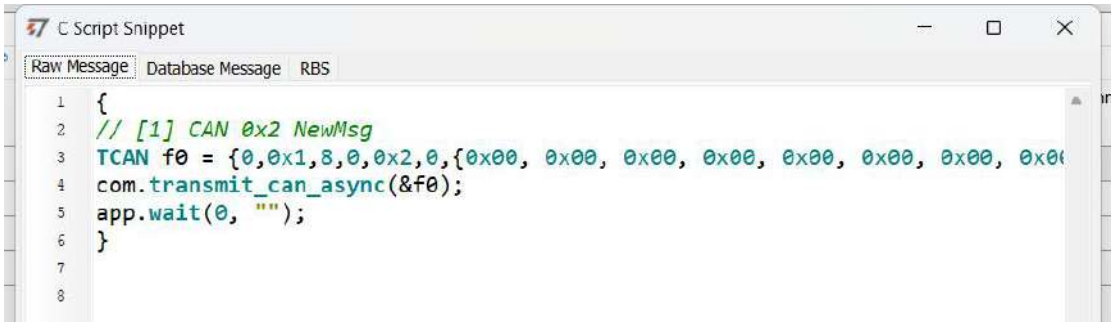
a. Message sending-Add a CAN / CAN FD message for sending

b. Right mouse button to create a new original message / add a message from the database, and set the message name / identifier / channel, etc

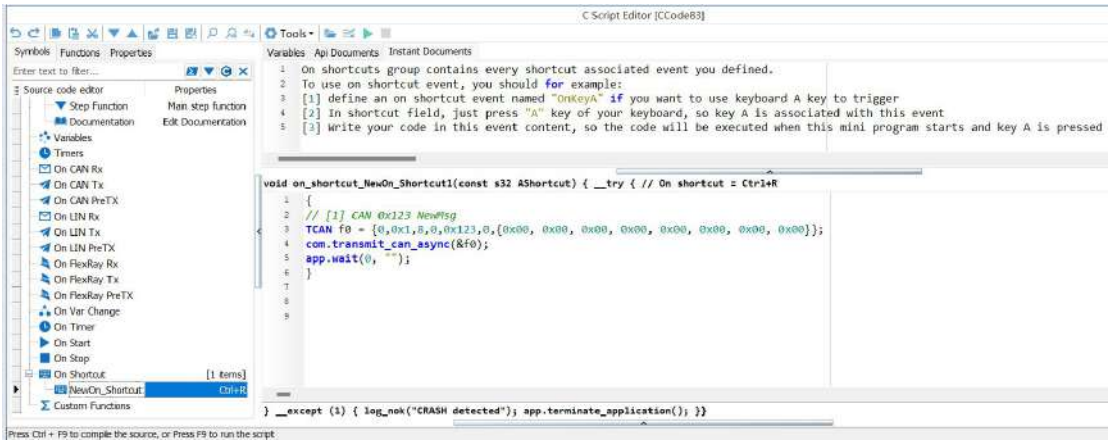
c. Message am trigger setting, manual trigger / cycle trigger, cycle trigger can set the sending cycle

d. Message information right click can generate a C script to quickly add to the C small program for programm

The following is an example of the build-C script:

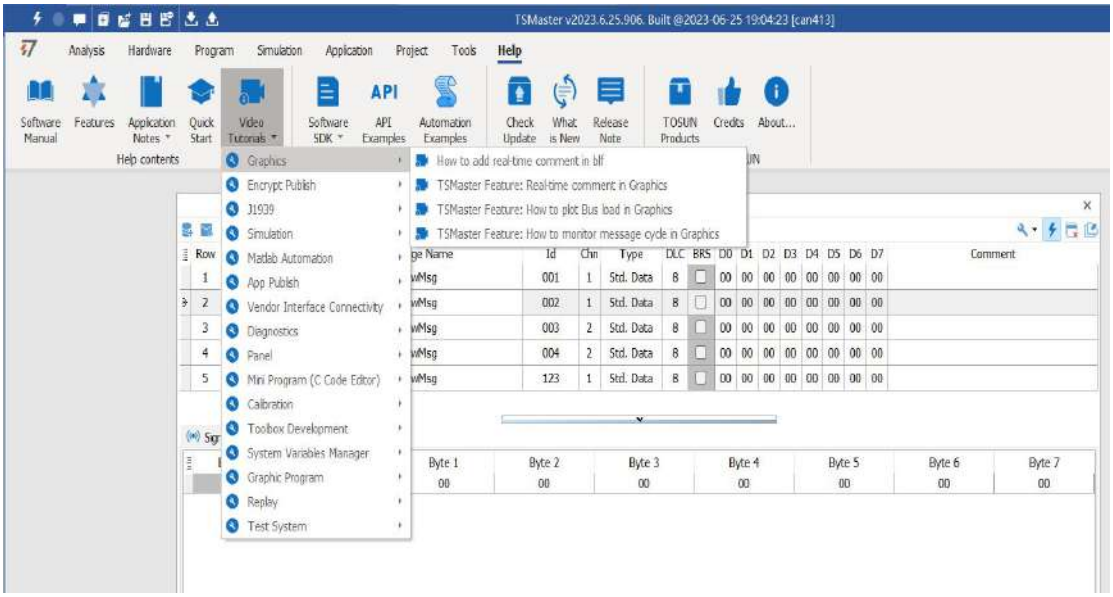


Support for quick copy and paste to a C script to add send events:



3.4 Help with documentation and video teaching

Various instructions and help manuals are provided in the TSMaster help bar.

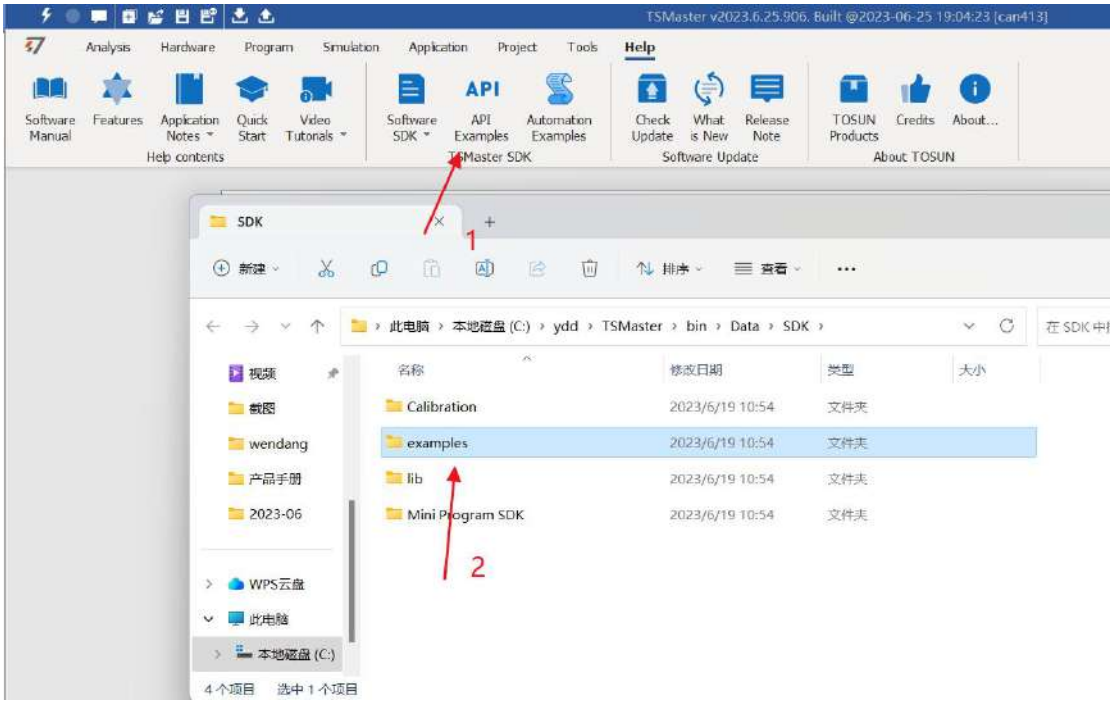


At the same time, a large number of teaching videos can enter B station

http s: / /space.bilibili.com / 2042371333, follow the tosun intelligent official number, watch all the teaching videos.

3.5 TSMaster API Secondary development

In the TSMaster help bar API routine, a variety of common language API is provided to facilitate users' secondary development. Efficient and easy-to-use secondary development functions that can support all kinds of development environments, such as C, Python, C #, Labview, etc.



3.5.1 Python calls the dynamic library

Windows32-Position Python:

（1）pip install TSMasterAPI

(2) Using the TSMasterAPI form TSMasterAPI import * for

(3) Example synchronous upload github, address: https: / / github.com/sy950915/TSMasterAPI.git

Windows64 bit Python / Li nux:

（1）pip install libTSCANAPI

(2) Using the TSMasterAPI form libTSCANAPIimport * for

(3) Example synchronous upload github, address: https: / / github.com/sy950915/ libTSCANAPI.git

3.5.2 C calls the dynamic library

(1) Include TSMaster in a file with a path of TSMaster \ bin \ Data \ SDK \ lib \ x86.h header file.

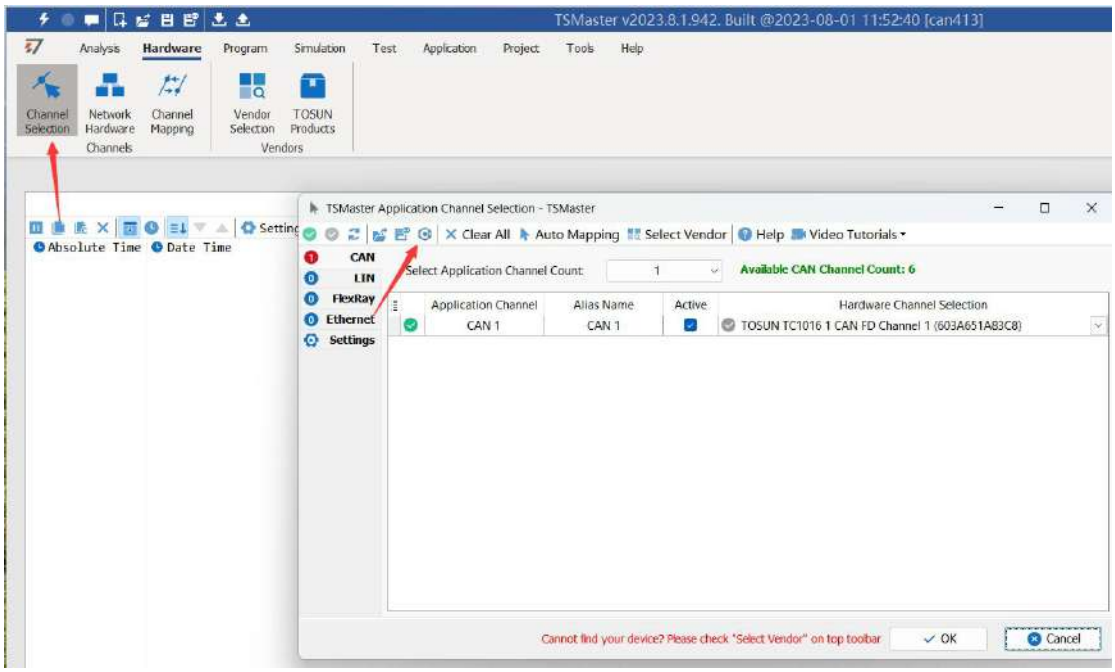
Such as: # include " TSMaster.h”

(2) Include TSMaster in a file with a path of TSMaster \ bin \ Data \ SDK \ lib \ x86. The lib file is connected to TSMaster.lib document.

In the C environment, add TSMaster to the Configuration Property connector input additional dependencies in the project property page.lib document.

3.5.3 Example of the calling of the interface

Windows, The Linux system provides the secondary development interface, easy to connect and use the equipment. The operation step are: select channel-generate C code-use C code / python code to call the interface. Take the code C as an example:



C Script Fragments:

C脚本片段

```c
initialize_lib_tsmaster("TSMaster");
tsapp_set_can_channel_count(0);
tsapp_set_lin_channel_count(1);
tsapp_set_flexray_channel_count(0);
tsapp_set_ethernet_channel_count(0);

TLIBTSMapping m;

// TSMaster LIN 通道 1 - TOSUN TL1001 1 LIN 通道 1
m.init();
sprintf_s(m.FAppName, "%s", "TSMaster");
sprintf_s(m.FHWDeviceName, "%s", "TOSUN TL1001");
m.FAppChannelIndex = 0;
m.FAppChannelType = (TLIBApplicationChannelType)1;
m.FHWDeviceType = (TLIBBusToolDeviceType)3;
m.FHWDeviceSubType = 4;
m.FHWIndex = 0;
m.FHWChannelIndex = 0;
if (0 != tsapp_set_mapping(&m)) { /* handle error */ };

if (0 != tsapp_connect()){ /* handle error */ };

/* do your work here */

tsapp_disconnect();
finalize_lib_tsmaster();
```

C script call function description:

initialize _ lib _ tsmaster ("TSMaster"); / / TSMaster initialization function

Tsapp _ set _ can _ channel _ count (0); / / Set the number of can channels

Ttsapp _ set _ lin _ channel _ count (1); / / Set the number of lin channels

The tsapp _ set _ flexray _ channel _ count (0); / / Set the number of flexray channels

The tsapp _ set _ ethernet _ channel _ count (0); / / Set the number of ethernet channels

TLIBTSMapping m; / / Initialize the construct

/ / Set the TSMaster LIN channel 1-TOSUN T L1001 LIN channel 1 channel mapping

m. The init (); / / initial construct m

sprintf_s(m. FAppName, "%s", "TSMaster"); / / Print the application name "TSMaster"

sprintf_s(m. FHWDeviceName, "%s", "TOSUN T L1001"); / / Print the hardware device name

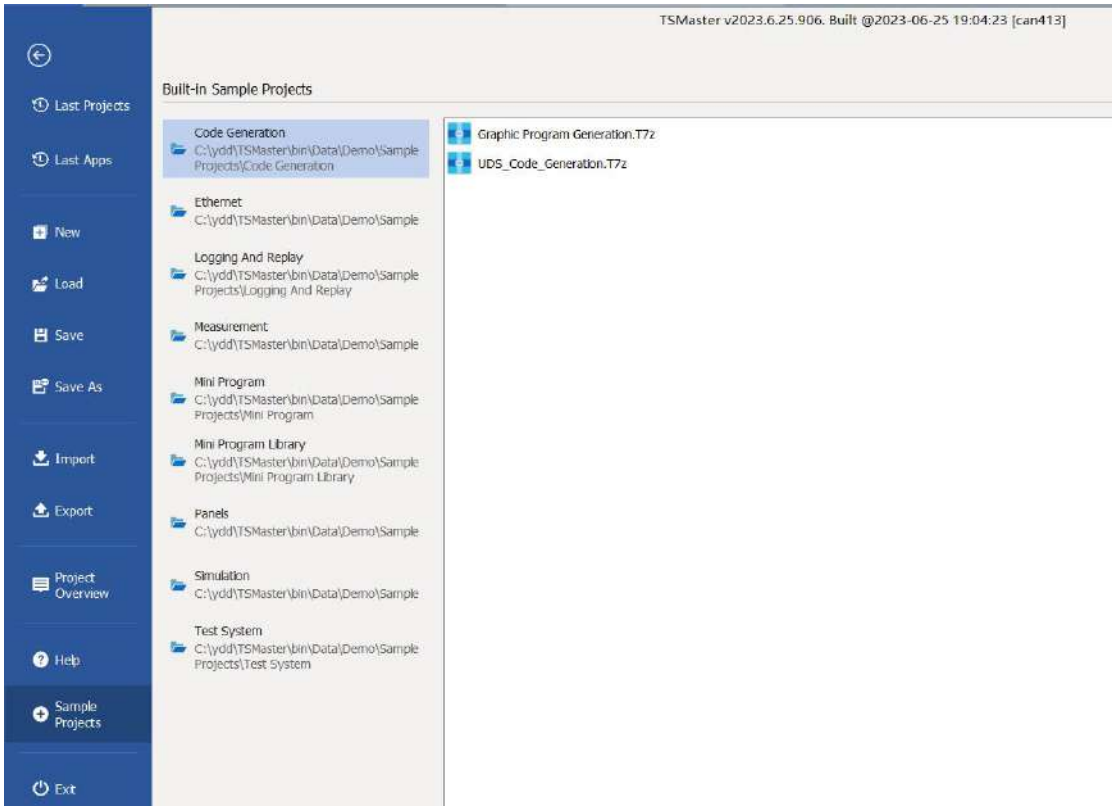
```
m. FAppChannelIndex = 0; / / Application channel index
m. FAppChannelType = (TLIBApplicationChannelType) 1; / / Application channel type
m. FHWDeviceType = (TLIBBusToolDeviceType) 3; / / Hardware device type
m. FHWDeviceSubType = 4; / / corresponding parameters of hardware equipment *
m. FHWIndex = 0; / / Hardware index
m. FHWChannelIndex = 0; / / Hardware channel index
if (0 != Tsapp _ set _ mapping (& m)) {/ * handle error * /}; / / If the return value is not equal to 0 mapping failure

The tsapp _ disconnect(); / / Disconnect the device
finalize _ lib _ tsmaster(); / / Release the C script module
```

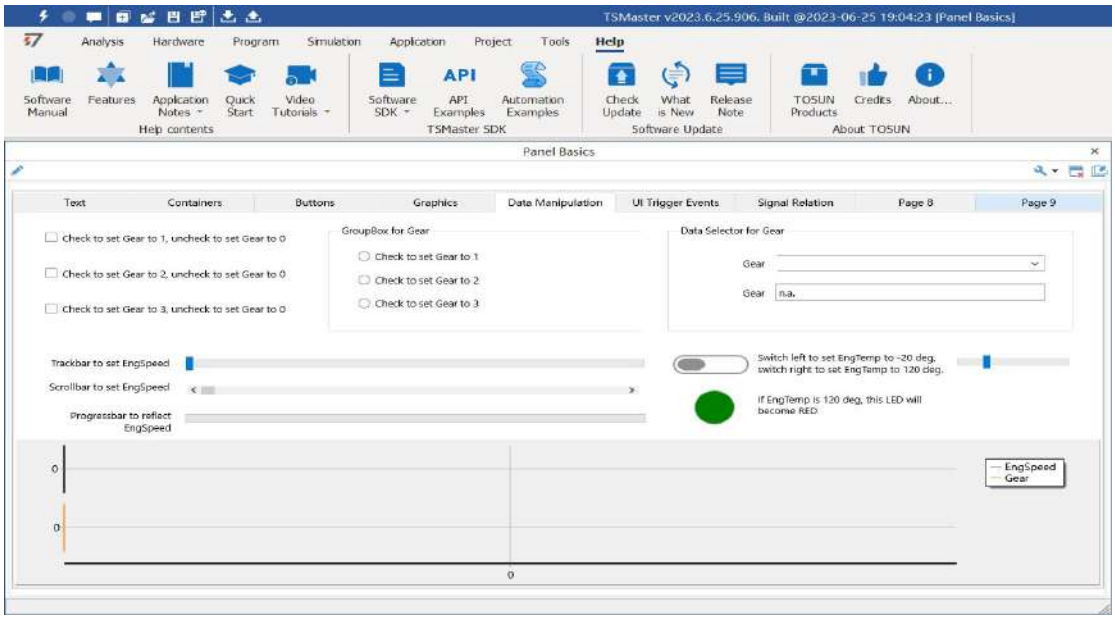
* Note: The corresponding parameters of the hardware equipment can be found in the TSMaster-Help-Software Development Package : TSMasterAPI_Hardware_Map.pdf

3.6 Sample Works

The example project provides a lot of Demo for user reference, greatly improving the user development efficiency.



Sample project panel:



4. Inspection and maintenance

TL1001 The main electrical component is the semiconductor component, although it has a long life, it may accelerate aging in the incorrect environment, greatly reducing the life. Therefore, regular inspections should be conducted during the use of the equipment to ensure that the use environment maintains the required conditions. It is recommended to check it up at least once every 6 months to a year. Under adverse environmental conditions, more frequent examinations should be performed. In the table below, if you encounter problems during maintenance, read below to find the possible cause of the problem. If the problem is still not solved, please contact Shanghai TOSUN Intelligent Technology Co., LTD.

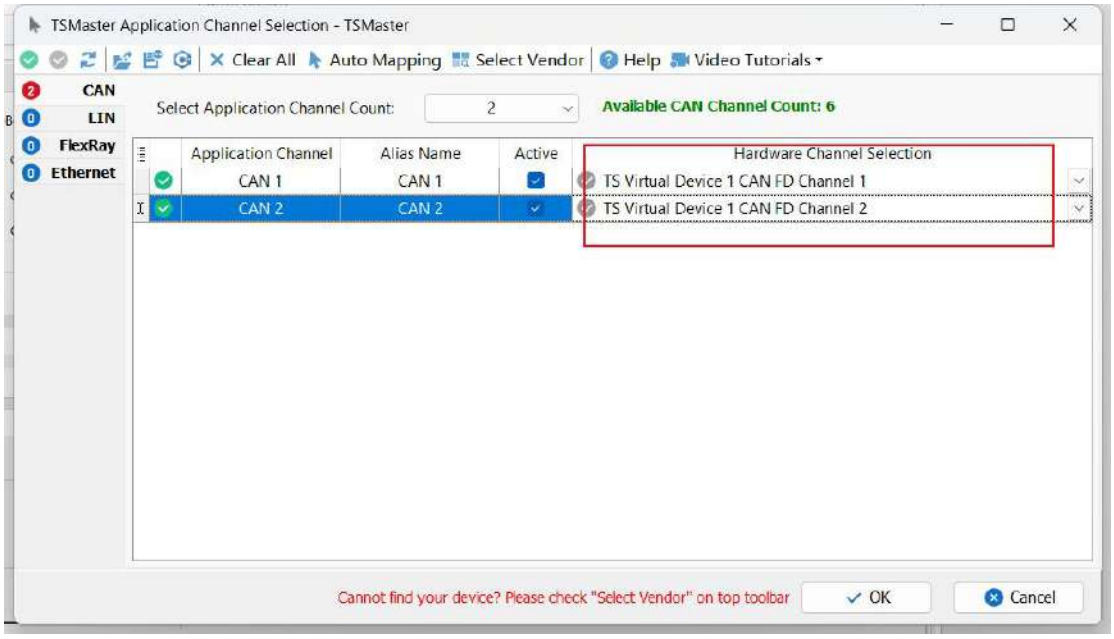
project	check up	standard	move about
power supply	Check the voltage fluctuation at the power supply side	7~18V DC	Use the voltmeter to check the source at the power supply input end. Take the necessary measures to make the voltage fluctuation within the range
surrounding environment	Check the ambient temperature (Including the internal temperature of the enclosed environment)	-40℃~+80℃	Use a thermometer to check the temperature and ensure that the ambient temperature remains within the allowable range
	Check ambient humidity (Including the internal humidity in the closed environment)	Without air conditioning, the relative humidity must be at 10%~90%	Use a humidity meter to check the humidity and ensure that the ambient humidity remains within the allowable range
	Check for the accumulation of dust, powder, salt, and metal debris	No accumulation	Clean and protect the equipment
	Check water, oil, or chemical spray collision into the device	No spray touched the device	If the cleaning and protection equipment is required
	Check for corrosive or	No easily	Check by smelling or using

	flammable gases in the equipment area	corrosive or flammable gases	a sensor
	Check the vibration and shock levels	The vibration and shock are within the specified limits	Install the liner or other shock absorber, if required
	Check the noise sources near the equipment	There are no significant noise signal source	Isolation equipment and noise sources or protection equipment
Install wiring	Check the compression connector in the external wiring	There is sufficient space between the connectors	Visual scopic inspection adjust if necessary
	Check for the damage to the external wiring	No damage	Visual inspection and replace wiring if necessary

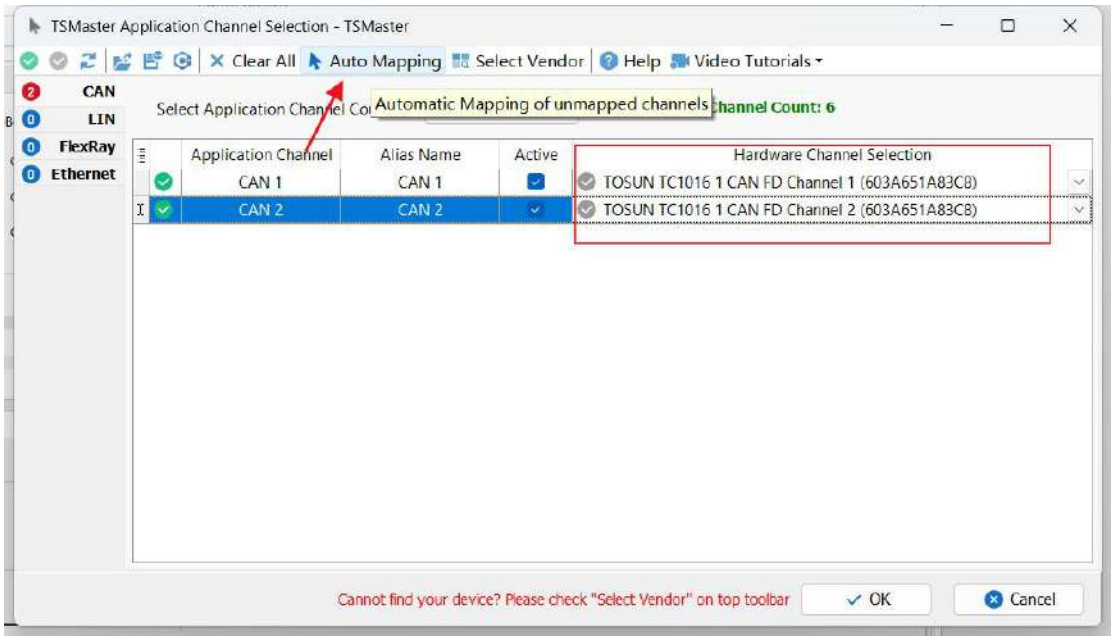
5. Common questions and answers

5.1 The line is connected correctly but cannot communicate properly:

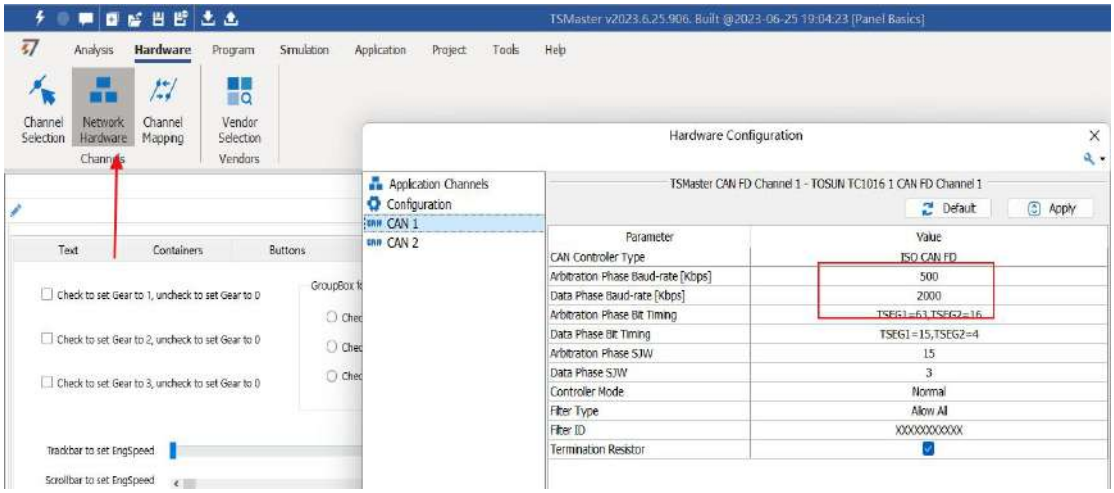
Solution: Check if the number of channels is set. If CAN Channel Count = 0, of course no online hardware cannot display. And the software is configured by default virtual channel, you need to select the hardware real channel.



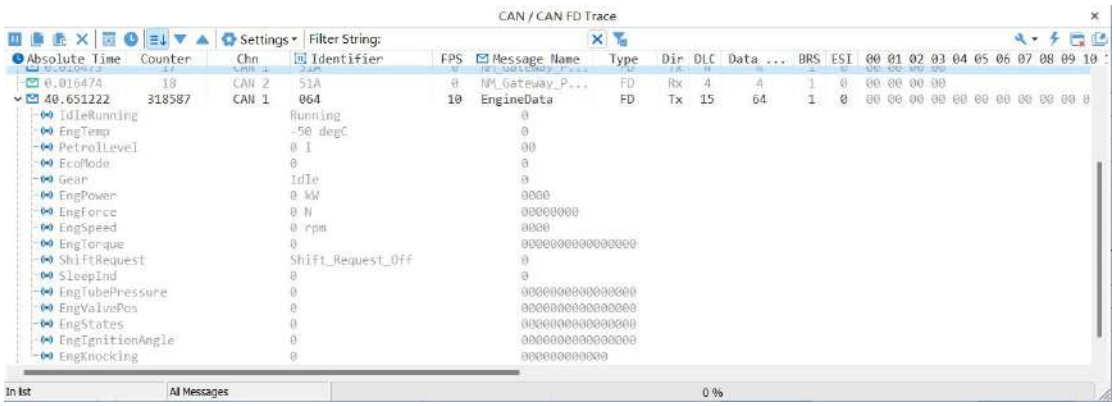
Automatically map or manually click to select the hardware real channel:



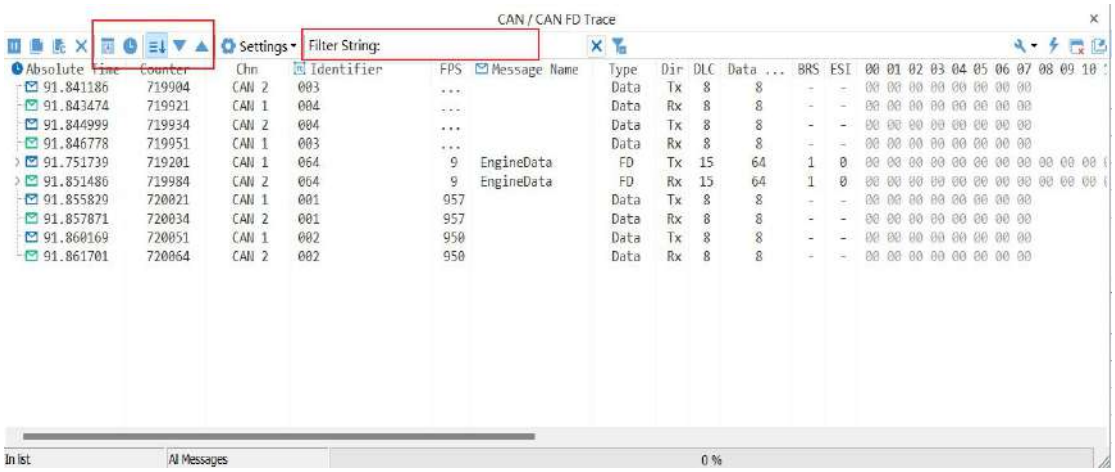
If the channel is selected correctly, it is necessary to ensure consistent port communication between the two channels, as shown in the figure below:



5.2 Inconvenient message observation and signal filtering:

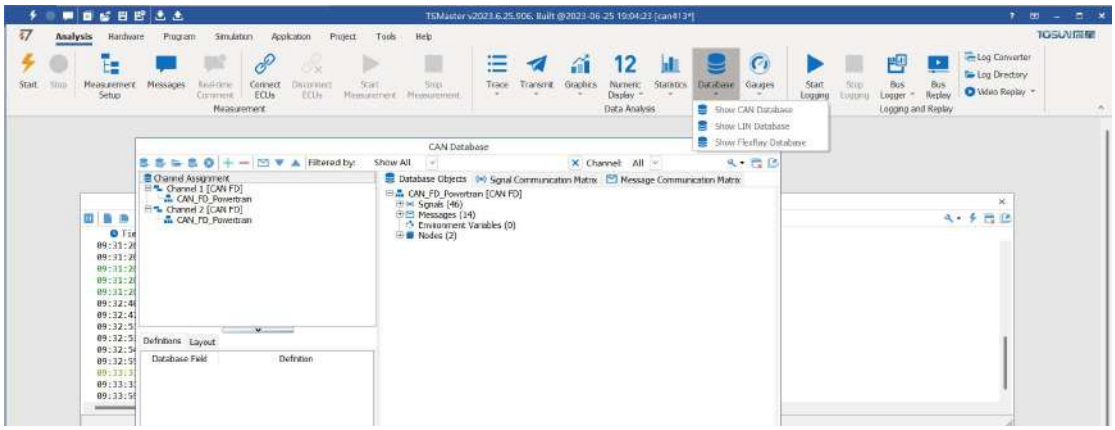


Solution: display in a fixed display or time order, expand or fold the signal display, and filter the string, click the following icon to operate:

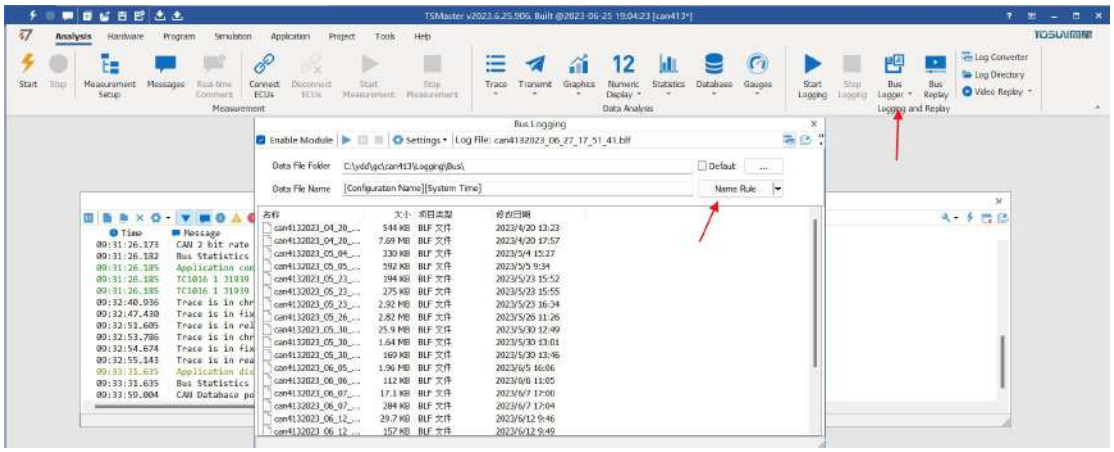


5.3 How to load the database:

Select the can / lin / flexray database, click the upper left corner icon to add the database file, or drag the file directly into this window to be automatically loaded, and then click the left channel to associate the database.



5.4 How to automatically record the message messages:



operating steps:

a. Analysis- -bus record

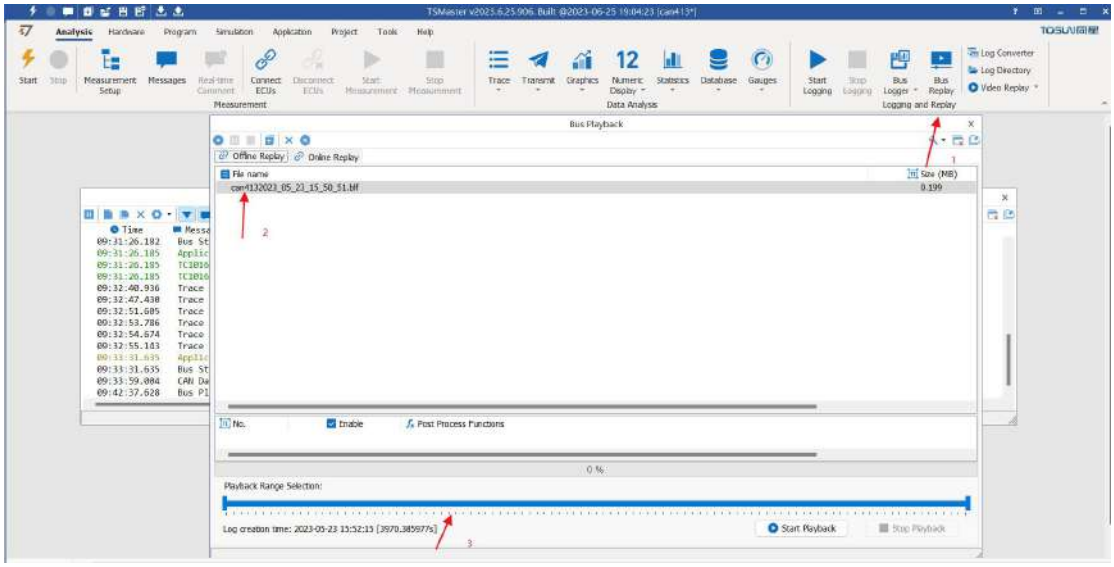
b. Add a name rule to distinguish between different save files

c. Add the self-start function

d. Start the record

5.5 How to replay messages (offline and online playback):

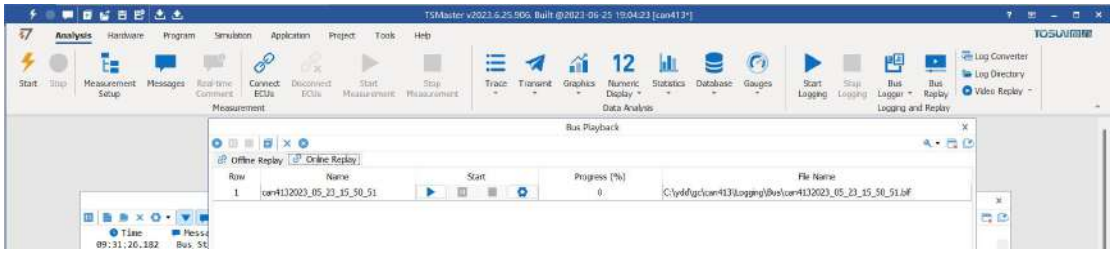
operating steps:



a. Bus playback

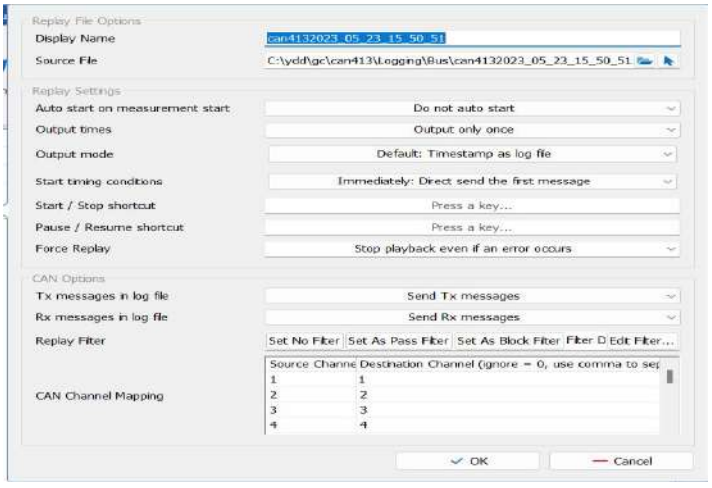
b. Offline playback, add the need to be played packets, can drag and drop file add directly

c. Select the range of message playback. Since the number of message display window is limited, you can choose the time period required for the message



d. Bus playback-online playback-add recording files

e. Online playback can playback the message according to the acquisition time stamp,and set the playback data



6. Appendix

6.1 matters need attention

① Connect the lines to avoid short circuit.

② Before using the equipment, please carefully check the pin information in the product manual.

③ During the operation of the equipment, be sure to connect the power cord correctly and avoid plugging and unplugging.

④ Attention! Damage caused by electrostatic discharge (ESD).

7. Disclaimer

Shanghai TOSUN Technology , LTD. based on the principle of providing better service for users, will present detailed and accurate product information for users as much as possible in this manual. However, since the content of this manual has a certain timeliness, TOSUN Technology cannot fully guarantee the timeliness and applicability of the document in any period of time. TOSUN Technology has the right to update the contents of this manual without notice. In order to get the latest version of the information, please visit the official website of TOSUN Technology regularly or contact the staff of TOSUN Technology regularly. Thank you for your tolerance and support!

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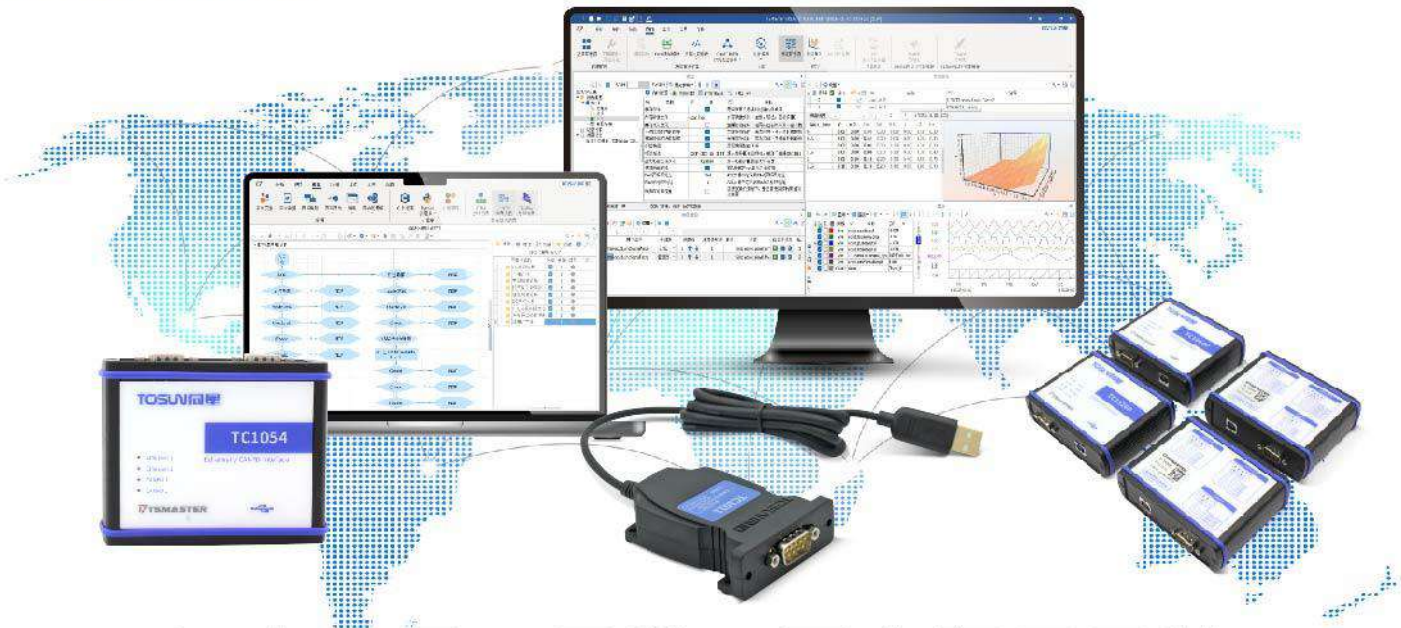

汽车电子工具链，国产领导品牌

同星智能成立于2017年，一直专注于研发国产自主可控的汽车电子基础工具链产品，也是该领域国产领导品牌。

同星智能的核心软件TSMaster及配套硬件设备，具备嵌入式代码生成、汽车总线分析、仿真、测试及诊断、标定等核心功能，覆盖了汽车整车及零部件研发、测试、生产、试验、售后全流程。

全球企业用户超4000家，用户覆盖：汽车整车厂、零部件供应商、芯片厂商、设备/服务供应商、工程机械、航空航天及舰船军工等领域。

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- 记录与回放
- 图形化编程
- 剩余总线仿真
- C/Python脚本
- 总线监控/发送
- SOMEIP和DoIP

硬件

- 1/2/4/8/12通道CAN FD/CAN转USB工具
- 1/2/6通道LIN转USB工具
- 10通道CAN FD/CAN转以太网工具
- 多通道Flexray/CAN FD转USB工具
- 多通道车载以太网/CAN FD转USB工具
- 车载以太网介质转换工具（T1转Tx）
- 多通道CAN FD/Ethernet/LIN记录仪

解决方案

- EOL测试设备
- FCT测试设备
- 汽车“四门两盖”试验解决方案
- 线控底盘测试解决方案
- 电机性能/耐久试验解决方案
- 新能源产线设备解决方案
- 总线一致性测试解决方案
- 信息安全解决方案

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